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ABSTRACT

The adoption of an information systems implementation strategy that emphasized user involvement at the University of Alaska, the only public university in the state, is discussed. The university sought to provide an online Student Information System (SIS) that provided convenient procedures for registering, tracking, and grading students, as well as accessing data to be analyzed for institutional research and planning. The diversity within the system, particularly academic policy and administrative procedures, required building a SIS that incorporated the varying needs of different campus users. Embracing the user perspective toward project management enhanced both the system design and campus commitment toward the development effort, established effective project team communication, and helped reduce the risk that non-data-processing tasks would end up on the project's critical time path and result in a delay in the implementation. Information is provided on the organizational structure for SIS development, the decision-making process, software and hardware selection, and the phases of SIS design and modification. (SW)

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BRINGING UP AN ONLINE SYSTEM: EXPERIENCES AT THE UNIVERSITY OF ALASKA

Project Management: A Key to Successful Organization and Implementation

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BRINGING UP AN ONLINE SYSTEM: EXPERIENCES AT THE UNIVERSITY OF ALASKA

Project Management: A Key to Successful Organization and Implementation

ABSTRACT

Coordinating a major statewide information system development effort for an education system comprised of unique four-year universities, community colleges, and an array of rural and distance delivery instructional components is a challenge. Compound it by making it the first development project for a centralized university computer center, by making the system being implemented a student information system running in the latest data base technology environment, by the existence of a complex university decision-making process due to a strong governance structure with strong tendencies toward campus autonomy and decentralized academic planning processes; by distributing these institutions as much as 2,000 miles from one another, and dependent on satellite relays for data transmission; and by making an implementation on an accelerated schedule in light of an eroding state revenue picture. Taken together, the constraints encountered by the student information system project at the University of Alaska forced the development of a non-traditional approach toward involving users from each campus in the system in all aspects of the systems development effort. Embracing this user perspective toward project management enhanced both the system design and campus commitment toward the development effort, established effective project team communication, and helped reduce the risk that non-data-processing tasks would end up on the project's critical time path and result in a delay in the implementation.

INTRODUCTION

The University of Alaska is a statewide system of public higher education. As Alaska's only public university, it is charged with providing for the postsecondary education needs of all Alaskans. Established as the land-grant institution for the State of Alaska in 1922 with a single governing board, the University of Alaska has grown into a series of higher education units which during the implementation of a new online SIS included three four-year universities, eleven community colleges, thirteen rural education centers, and a central system administration. While its roots go back nearly 70 years, today's University of Alaska is largely a product of public policy decisions made during the 1970s and 1980s. The sudden affluence of the State of Alaska in the last decade brought rapid growth to the University system, particularly in the number of campuses operating, in the instructional program depth, and in the magnitude of research and public service efforts. Due in part to this sudden affluence, the vast geographic area served, the diverse cultures this area encompasses, and Alaska's public policy of providing a high level of access to postsecondary education across the state, the administration of the University has evolved into a highly diverse structure by 1987.

During this period, a commitment was made to build a centralized state-of-the-art administrative data processing center and develop enhanced administrative systems that would meet the needs of users. Prior to this commitment, services were provided by a facilities management company. Only in the last five years has the University of Alaska taken over responsibility for computing. Thus, for the first time the University was embarking on a path of systems development with users in charge.

STATEMENT OF THE PROBLEM

During the development of SIS, the institutions of the University of Alaska system were markedly different in their goals, objectives, operational procedures, and information needs due in part to: 1) different educational orientations, 2) historical/political influences, 3) the markets they served or intend to serve, 4) the number and background of their student enrollments, 5) the state of academic, administrative, and facilities development, and 6) staffing and funding variations. Community colleges having an open-door admissions policy and espousing the community college philosophy that were so small in size that many administrative functions, such as admissions and student records processing, were done in a statewide community college administration office. At the other end of the spectrum existed four-year research universities each with the autonomy to fashion the academic-related policies most appropriate for their institutional objectives, such as selective admissions policies, unique academic warning- probation-dismissal processes, course numbering schemes, and the definition of class contact hour. Some were large enough to perform almost all administrative functions efficiently and effectively. The diversity within the system, particularly the academic policy and administrative procedure dimensions, required the building of a new statewide student information system to incorporate the varying needs of all campus users. The wealth of institution specific practical knowledge in the area of admissions, student registration, and student records existed only with campus users. For the new Student Information System (SIS) implementation project to succeed, some mechanism had to be created to facilitate users in becoming equal partners on the development team.

HOW THE UNIVERSITY APPROACHED THE PROBLEM

An Organization That Involved Users

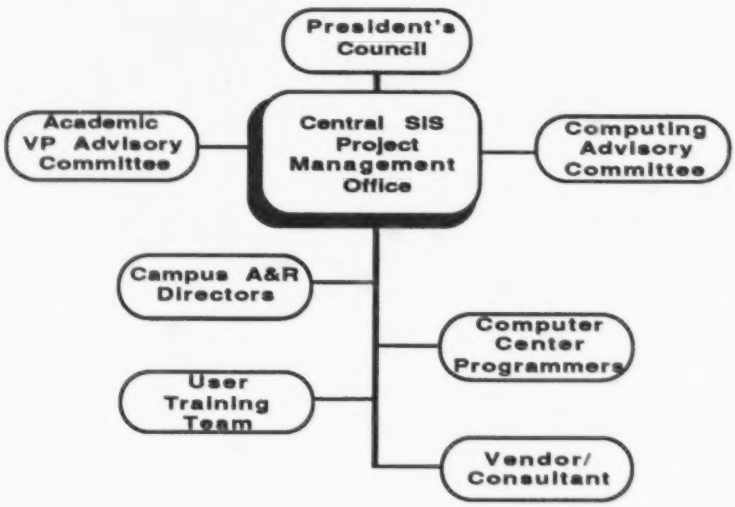
Most data processing development projects have historically revolved around the computer centers and have been directed by technical staff. The users, historically, have avoided becoming involved in the mystique, terminologies and languages of computers, leaving this process to the data

processing departments.

The University of Alaska (UA) changed its system implementation philosophy by putting the responsibility where it more properly belonged - - - with the user. To accomplish this, UA adapted an organizational structure for project development efforts that included a management advisory committee (MAC), representatives from each major academic unit (MAU), a Training Team, various resources teams, and a Project Team. The MAC was comprised of top level administrators from each campus and were primarily the academic vice chancellors from throughout the system for SIS. The MAU committee members were the campus coordinators for the subject area being addressed by the project, from each of the units. The Training Team was composed of typical users from each of the units. The resource teams were members of the central administration responsible for the particular subject area being addressed, members of the computer center responsible for the actual construction, operation and maintenance of the information system, and representatives from the vendors involved. Lastly, the Project Team itself was composed of members of the user community addressed by the project subject area, and included a Project Director who was responsible for the entire project and a Project Leader who was responsible for particular implementation tasks.

The Student Information System project for the University of Alaska developed this relationship and moved ahead to implement a system recognizing the needs of users, balancing that with the technological capabilities that are available for solutions to user requirements. During this ***transition*** to project management by users, it was important that users increasingly feel responsibility for and direct the activities of the project. At the same time, it was important that data processing present a clear statement of alternatives and consequences from a technical standpoint so that decisions could be made that considered all the trade-offs, both in system functionality and technical/cost impacts. The following chart, Figure1, illustrates the organizational structure for the SIS project at the University of Alaska.

FIGURE 1. PROJECT ORGANIZATION



Decision Making Process

Because of the varied nature of the University and the involvement of multiple campuses, the decision making process could, and at times did, become complex and cumbersome. It is important to

involve as many people as possible at the appropriate times to gain input and to assist reaching a decision. However, decisions still had to be made and the old proverbial expression "being designed by a committee" could of had its consequences in this structure as much as any other if not managed appropriately. It remained extremely important that decisions be reached in a timely, straightforward manner if the project was to be completed on time. In the implementation of the SIS project at the University of Alaska, this process did on occasion take longer than was desirable. On the other hand, the price of the approach taken had to be paid in some time inefficiencies. It has been shown repeatedly throughout the implementation process that this price was worthwhile for the SIS project. It was necessary, however, to guard against letting it become a deterrent to getting the job done. This was accomplished by setting deadlines and using automated project management techniques such as PERT and Gantt charts, so everyone knew who is dependent on whom. Within the organizational structure in place at UA, the actual decision making still had to be made at the Project Director level with approval through the administrative channels. In Figure 2, the multiplicity of decision groups the Project Team coordinated with indicates the degree to which this guaranteed user review.

The management advisory committee (MAC) was established as an advisory committee to the Project Team; however, experience has indicated that management advisory committees, which consist of high level administrative staff, wanted to function periodically as the policy making and decision making body for the project. This has been useful except when that body did not feel it had the authority to set a particular policy before feedback from campus assemblies or campus chancellors which impeded agreement in a timely fashion. For the most part, the SIS MAC struggled through some very difficult issues and was able to resolve them in a reasonable timeframe. Some of the issues resolved consisted of consolidated tuition structures, uniform grading policies, and campus-specific academic action calculations. In sum, the trick was in managing the project in a fashion that ensured adequate time was allotted to permit users to set the project direction thereby making the necessity of unilateral decisions by the Project Team rare at best .

FIGURE 2. COORDINATED DECISION GROUPS

State-of-the-Science Technology

When the University of Alaska embarked on upgrading its administrative computing capabilities, it issued an RFP for a Student Information System (SIS) and a Human Resource System (HRS) with associated hardware. The results of the RFP were the selection of Information Associates' SIS and HRS systems running in Cullinet's IDMS environment. Also part of the process was to select

programmer productivity tools and user support tools which would allow the users to perform much of their data processing functions without having to rely on the technical expertise of the programming staff. The upgraded hardware was installed first, followed by the base system for SIS and HRS. The applications systems, before they could be put into production however, had to be modified because of the unique requirements of the University of Alaska. The RFP process resulted in the use of personal computers as workstations in order to provide a backup capability in the event of a disruption in the communications network or in the Control processing unit. Figure 2 depicts the geographical size and extent to which the University is committed to providing computing throughout the state. It should also be noted that the University of Alaska Computer Network provides for 5500 miles of long distance phone lines. Another purpose for the use of microcomputers was to provide a micro to mainframe connection that would allow the downloading of information from the mainframe to microcomputers for data analysis.

FIGURE 3. UNIVERSITY OF ALASKA COMPUTER NETWORK

As part of the software that was obtained, Cullinet's IDMS Management System was purchased, along with the associated products for development. These were used extensively for modifications as well as enhancements to the SIS package. It is anticipated that users will assume responsibility for many of the ad hoc reports, utilizing the query languages and 4th generation languages that are to be made available. As part of this, the University of Alaska is putting into place a support mechanism for training and assisting users in the application of these products.

Initial training sessions were conducted for the technical staff and a limited number of users. The training has been reasonably successful; however, it needs to be pointed out that training must be associated with using the product. Portions of the training were conducted without the availability of the software and much of that training was less effective than it would have been due to the lack of hands-on reinforcement.

Project Management as the Transition Key

The key to making a successful transition from DP managed development projects to user managed projects was effective project management which integrated the strengths of both the data processing professional and the functional user. At the University of Alaska, this process began with compiling the administrative systems RFP where both programming and campus administrative staff collaborated. The user role was continually expanded from bid finalist site visitations through the identification and prioritization of software modifications. The manner in which software modifications were identified, used to construct implementation alternatives, and how project tasks were communicated serves as a good example of how project management techniques can be used to integrate user and programmer.

In the spring of 1985, University of Alaska campus chancellors requested that the newly establised SIS Office develop a number of system implementation alternatives that would clearly present the trade-offs for each alternative in terms of functionality, required resources, and full system live dates. The major objective was to try to find areas which could be changed in order to allow an accelerated implementation schedule ahead of the originally estimated Fall1987 date.

A four-phase process was followed to facilitate the completion of the analysis in the timeframe provided:

- **Phase I - Identify SIS Modifications**
  In order to understand the software product the University had bought in relation to possible modifications that might be needed, the SIS Training Team comprised of campus users had to first complete SIS training. A number of meetings with campus, data center, and IA personnel subsequent to the end of the training period produced a list of two dozen required modifications to the base SIS system.

- **Phase II - Write Modification Specifications and Prioritize**
  A six question format, which incorporated both technical and functional questions, was developed to organize modification specifications in a comparative manner. The questions were: 1) what would we like to do, 2) what does the current system(s) do in this regard, or how do we handle it now, 3) what does IA's SIS currently have, 4) what alternatives do we have to satisfy the need for this modification, 5) what are the pro's and con's of each alternative, and 6) what is the recommended alternative, particularly in relation to cost, time, and manual impacts. MODS ID Teams, teams comprised of one campus user and one programmer, were assigned to every modification and were charged with compiling responses to each of the six questions for their modification. The most difficult aspect of the questions centered on the validity of the time estimates to complete any particular modification. No satisfactory numerical process was found superior to a best guess approach utilizing experienced users and programmers. All modification six-question write-ups were then studied by campus and central office representatives prior to being prioritized as being either absolutely necessary before turning the system on or not.

- **Phase III - Construct Multiple Implementation Scenarios**
  Four base scenarios were developed by varying the following variables: 1) whether one or multiple data bases would be used, 2) whether one or several independent copies of the SIS software would be used, 3) the manner in which campus differentiation would be handled, and 4) whether or not a phased approach to adding software modifications would be used. PERT (Program Evaluation and Review Technique) models were developed based on the parameters imposed by each of the scenarios detailed as well as the modifications identified by campus users. A minimum number of set dates were used, thereby preventing the introduction of an excessive degree of slack, or unproductive wait time into each model.

The models were used to refine tasks and task dependencies within the SIS development and design process and to calculate both pilot campus and full system implementation live dates.

- **Phase IV - Rank Each Scenario In Relation to Impact Variables**
  The final phase included comparing the relative rating of each scenario in relation to the following eleven key impact variables: 1) separation of campus data, 2) centralized reporting, 3) campus reporting, 4) software maintenance, 5) standard data definitions, 6) data redundancy, 7) computer center hardware, space, and staffing, 8) campus staffing needs, 9) interfacing to other system, 10) time to implement, and 11) additional cost. Campus chancellors picked the scenario which mandated the use of one data base and one software copy which included only the modifications identified as being high and medium priority. The scenario chosen showed a Fall 1987 full system implementation date (Gaylord, Helmuth, & Newell, 1985, p. 192).

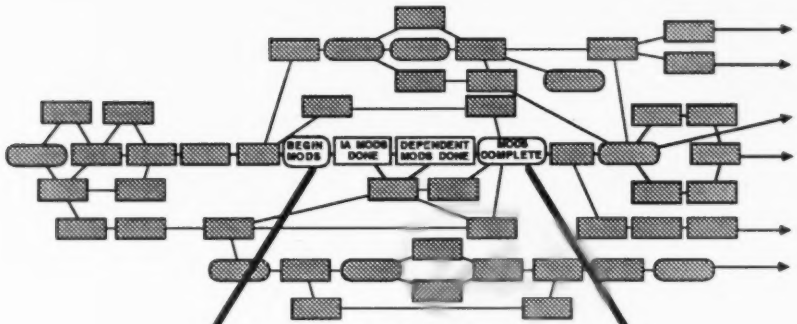
In each phase, campus users were either involved in assessing or designing functional system characteristics and modifications or in the final decisions concerning the project implementation schedule. The approval of the modifications and their descriptions also served as a first step in delimiting functional and technical modification specifications needed by the DP center and consequently helped save considerable time on these and succeeding tasks.

Once this implementation milestone was completed, project management techniques were also used to plan, communicate, organize, monitor, test alternatives, and assess project progress. Figure 4 is an example of how nested PERT charts were used to manage the project. On each task box, starting in the upper left hand corner, are displayed: 1) earliest start time, 2) the time duration in days required to complete the task, 3) latest completion time, and 4) resources assigned or required to complete the task. All PERT systems use a network to graphically portray the interrelationships among the tasks and milestones (key dates, meetings, events) of a project. The network representation of the project plan also shows all the precedence relationships regarding the order in which tasks must be performed (Hillier & Lieberman, 1974, pp. 230-241).

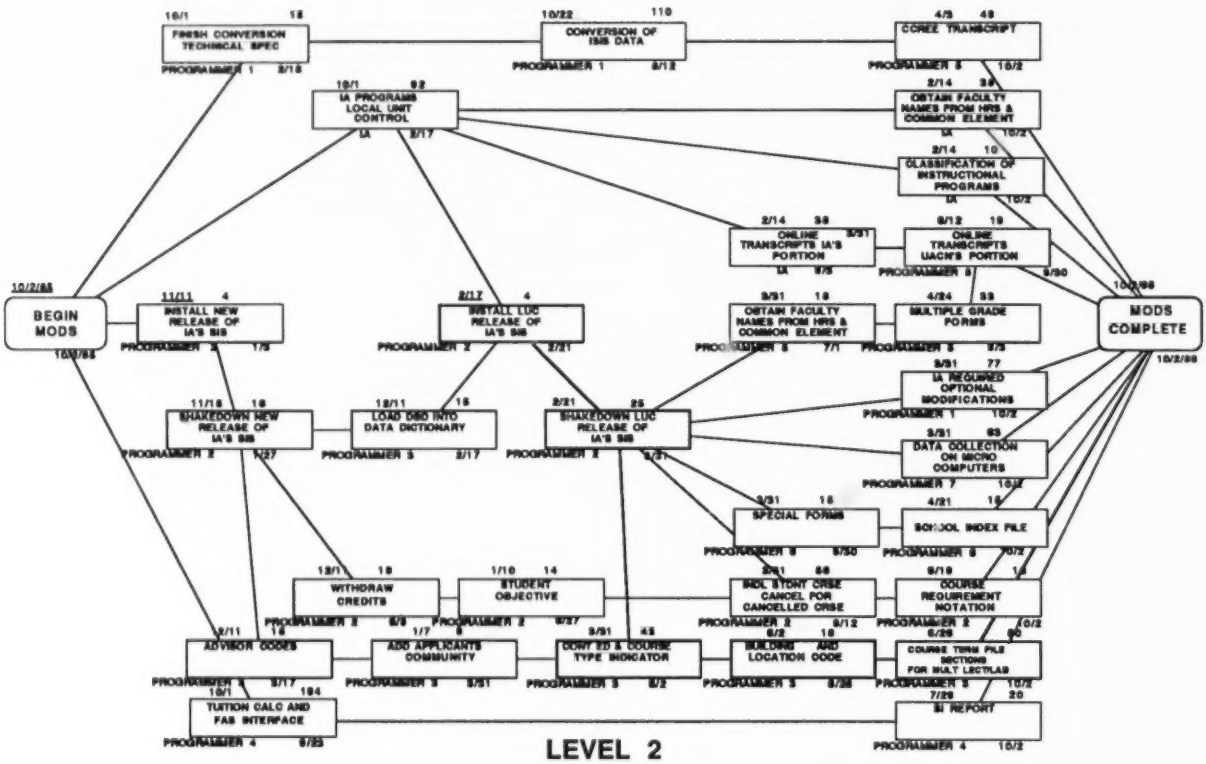
For the SIS project, three levels of PERT detail were designed with different user levels in mind. The first level, the overall project schedule comprised of the highest aggregation of tasks, was targeted primarily for executive administrators, particularly the academic vice chancellors that comprised the SIS management advisory committee, and their need to know the major project events. Tasks at Level 1 were assigned principally to the campus, the data center/IA, or the SIS Office. Level 2 schedules detailed major project tasks by campus and individuals within the data center and the SIS Office. These schedules were targeted primarily to assist campus SIS coordinators and programming managers with planning for major task deadlines. The most detailed chart, Level 3, listed tasks by individual breakdowns and was coupled with a tasklist, or Gantt chart of assignment descriptions, earliest task start dates, latest task end dates, and estimated task durations. These tasklists were used to structure actual daily work assignments for both users and programmers.

The use of PERT for constructing various levels of project planning, control, and scheduling for different degrees of user involvement has been invaluable for organizing the systems development project, testing alternative plans, revealing the overall dimensions and details of the plan, establishing well-understood management responsibilities, and identifying realistic expectations for the project. Taken together, the various levels of task descriptions functioned to provide a structured process in which to ensure maximum participation from and maximum communication to campus users around the state. The large investment in time and effort needed, paid off in the highest possible user - programmer integration, and in the end the successful implemetation of an online Student Information System.

PROJECT MANAGEMENT:
NESTED PERT CHARTS



LEVEL 1



LEVEL 2

8

SUMMARY AND CONCLUSIONS

The University of Alaska was committed to providing an onlineStudent Information System that met the needs of all University users; to provide for convenient procedures for registering, tracking, and grading students, as well as accessing data to be analyzed for institutional research and planning purposes. To allow this to happen as effectively as possible, UA adopted a new information systems implementation strategy that emphasized user involvement. The result of this strategy was the successful implementation of SIS. As the SIS project developed, there was a more realistic recognition of the magnitude of the required tasks, rather than a crisis inspired discovery of the same. The increased user community consciousness was attributable to their involvement this strategy required, which was sustained over the length of the implementation project and beyond it. A much smoother process resulted than had users not been so involved. For example, the revised 1986 project schedule, after more than a year into the project, resulted in the initial processing to occur two semesters earlier than was originally forecasted. Moreover, a greater user confidence in the end product and greater user satisfaction continued through to implementation.

The secret: instill a feeling of ownership on the part of the system's users by allowing users to control their destiny.

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